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FINAL REPORT

Energy Environment Simulator Field Program
in partial fulfillment of the requirements
for Task 2-4.1(2)

Submitted by

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to the

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ABSTRACT

The Energy Environment Simulator Field Program (July 1977 through March 1978) was established to increase public awareness and to disseminate information about the nation's energy situation to diverse groups throughout Montana. Presentations utilizing the Energy Environment Simulator were made to 67 groups (approximately 3,135 people). The presentations consisted of a demonstration of the simulator and usually included a slide show and an energy/environment discussion with audience participation. The slide show covered the development of energy utilization and a description of the national supply/demand relationships. Audience participation was an important aspect of the program. Participants included four categories: high school students, college students, adults, and a mixed age group.

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I. INTRODUCTION

The Montana Energy Research and Development Institute (MHD) Energy Environment Simulator Field Program was initiated in July 1977. The purpose of the program was to increase public awareness in Montana of the United State's existing energy situation and to generate discussion, interaction, and feedback among the state's populous concerning energy and environmental interrelations. The program also served as a pilot test of the effectiveness of the simulator as a public education/information sharing tool.

The public education goals of the field program were achieved through the utilization of an "energy games" concept which enables participants to become actively involved in hypothetical control of numerous factors regarding energy supply/demand fluctuations and environmental quality and their interaction.

The target populations of the field program and the presentation format are discussed in detail in Section II. The simulator "hardware" and "software" are described in Section II. Observations made during the Field Program and an analysis of audience acceptance and feedback are contained in Section IV. Section V presents project conclusions.

II. PROCEDURES

A. Target Populations

The Energy Environment Simulator Field Program was directed toward three groups: high school students (largely juniors and seniors), college students, and adult groups. A fourth, mixed group consisted of people of diverse age groups.

During the period July 1977 through March 1978, a total of 67

presentations were given to approximately 3,135 individuals of the four groups mentioned. Table 1 presents a tabulation of the dates, locations, target populations, and attendance at presentations. Table 2 depicts the four target populations by number of presentations provided, number of individuals in attendance per presentation, and average attendance in the case of multiple presentations.

The high school group received the greatest number of presentations (31 total) largely due to accessibility of this population through an organized classroom environment. This also enabled the presentations to be conducted several times within a single day. Adult group presentations, on the other hand, generally were made to special interest groups. Multiple presentations were scheduled for locations distant from Butte to facilitate maximum utilization of staff time allocations.

During The Montana Trade Showcase in Billings, Montana on September 16, 17, and 18, 1977, a total of 18 presentations were made, accommodating 1,200 persons across a broad age spectrum.

B. Presentation Format

The following uniform format was used in all presentations made during the Energy Environment Simulator Field Program. At the beginning of the program, participants were asked three general questions regarding their beliefs concerning energy-related topics (see Appendix). In certain instances, a fourth question was utilized (see Appendix). Each group then was provided preliminary information explaining the energy simulator. Descriptive posters and energy-related literature also were made available.

Based on time availability, a ten- to thirty-minute slide show

TABLE 1

ENERGY ENVIRONMENT SIMULATOR FIELD PROGRAM

SCHEDULE OF PRESENTATIONS

THOMAS H. PELLETIER - PRESENTER

Date	Location	*	Group Type & Name	Attendance
7/22/77	Billings	A	Mont. International Trade Commission	40
8/17/77	Bozeman	H.S.	Montana State 4-H Group	15
8/18/77	Butte	A	Governor's Forum	120
9/16,17, 18/77	Billings	M	Montana Trade Showcase (18)**	1200
9/26/77	Anaconda	A	Rotary Club	45
9/29/77	Anaconda	A	Community Information Breakfast	50
10/6/77	Billings	A	Montana Associated Utilities	200
11/1/77	Butte	C	Montana Tech - Ethics & Technology	25
11/9/77	Missoula	C	Univ. of Montana Env. Grad St.	20
11/9/77	Missoula	C	Univ. of Montana Env. Ed.	22
11/9/77	Missoula	C.	Univ. of Mont. Env. Soc.	15
11/10/77	Missoula	H.S.	Loyola-Sacred Heart H.S. (5)**	135
11/16/77	Helena	A	Montana Dept. of Natural Resources	10
12/14/77	Billings	A	Montana Geological Society	125
12/15/77	Billings	H.S.	Billings West H.S. (6)**	150
12/20/77	Butte	C	Mont. Tech - Human Values Symposium	28
1/9/78	Missoula	A	Lions Club	100
1/10/78	Missoula	A	Kiwanis Club	75
1/12/77	Butte	C	Montana Tech	20
1,30,31, 2/1/77	Butte	H.C.	Butte Central (12)**	350
2/15/77	Butte	A	AAUW	10
2/20/77	Butte	A	Business and Professional Women	35
2/21/77	Butte	C	Montana Tech - Env. Economics	10
2/23/77	Whitehall	H.S.	Whitehall High School (2)**	60
3/21/77	Butte	H.S.	Butte High School (5)**	275

* A = Adult Group, H.S. = High School, C = College Group, M = Mixed Group
** Number of presentations

TABLE 2

SIMULATOR FIELD PROGRAM
PRESENTATIONS SUMMARY

Type of Group	Presentations	Attendance	Average Attendance per Presentation
High School	31	985	31.8
College	7	140	20
Adult	11	810	73.6
Mixed	18	1200	66.6
Total	67	3135	46.8

was presented. The slide presentation included information on the historical development of energy utilization, energy supply/demand relationships, and current and future use of new technology.

Following the slide presentation, participants were provided a step-by-step explanation of the simulator including the background of its development and operation. Each of the simulator's eight functional areas were explained with emphasis upon the interrelation of the area within the operational matrix.

After operating instructions were completed, participants were divided into five groups and were given an opportunity to manipulate factors in the simulator with the goal of achieving and maintaining an energy/environment balance. The operation of these control panels enabled the participants to become active in the decision-making process. Their experience in taking responsibility for maintaining an energy/environment equillibrium served as a springboard for group discussion.

III. THE ENERGY ENVIRONMENT SIMULATOR

A. Background

The Energy Environment Simulator (Figure 1) was designed by Dr. John Amend of the Montana State University Department of Chemistry. The simulator was developed under an initial contract between the university and the Atomic Energy Commission (AEC).

In April 1973, the AEC initiated a program entitled "The Citizens Workshop on Energy and the Environment." The program was designed to educate the general public about energy and environmental interaction in the United States. The program subsequently

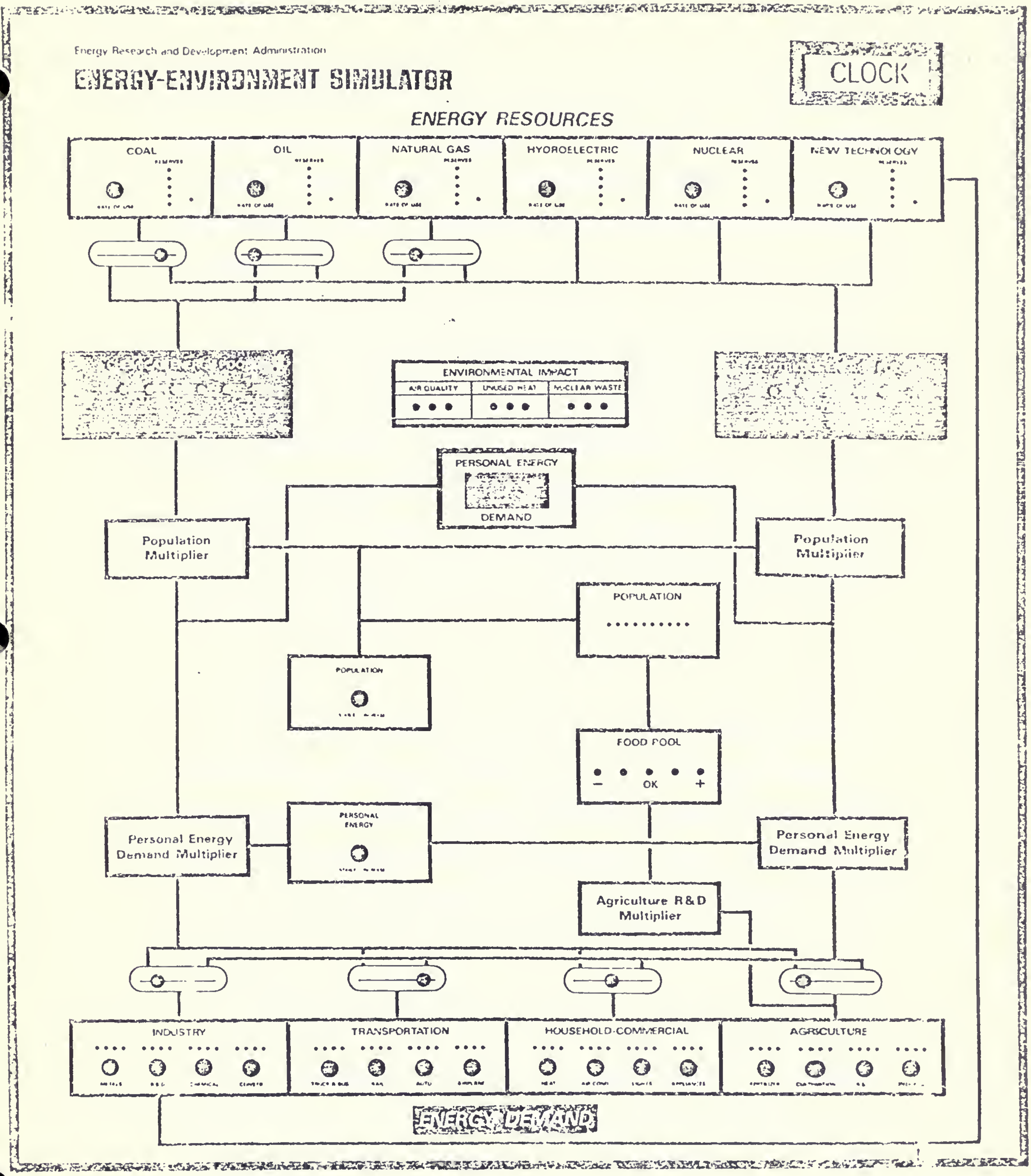

Figure 1--Energy Environment Simulator Information Flow

The information flow through the Energy Environment Simulator's model is illustrated in this flow diagram.

was expanded under contract to the Energy Research and Development Administration (ERDA). The goal was to educate the public regarding the complexities of energy and environmental interaction via a workshop format. This format was utilized to enable active citizen participation.

The Citizens Workshop Program currently is sponsored by the Department of Energy (DOE). The program is coordinated throughout the country by the Northwest College and University Association for Science (NORCUS) based in Richland, Washington.

MERDI acquired a national energy/environment simulator from Montana State University. The Energy Environment Siumlator Field Program utilizing the simulator has been sponsored by MERDI with assistance from NORCUS.

B. "Hardware"

The simulator hardware consists of a main display console constructed of a circuit board and five hand-held control boxes. Major areas on the display console are energy resources and energy demands. Associated functions (environmental impact, population, personal energy demand, and food pool) are located between the two major areas. Dials in each area enable adjustment of assumptions to accommodate recent data.

The hand-held control units consist of a dial which can be adjusted to increase or decrease the energy resources or demands, enabling participants to manipulate simulator functions.

C. "Software"

The simulator is programmed to enable the manipulation of the eight components described below.

1. Time Clock

An adjustable time elapse mechanism in the simulator calculates time passage at an equivalent of either 25 years or 100 years per minute. A four-digit read-out panel displays elapsed time from 0 to 9,999 years.

2. Energy Resources

Energy resource components programmed into the simulator represent total energy reserve (including imports) available to the United States. Six energy forms are included: coal, oil, natural gas, hydroelectric, nuclear, and new technology. Calibration of these resources were based on current contribution level expressed in percentage (see Table 3). Environmental impacts calibrated into the simulator included three areas: air quality, unused heat, and nuclear waste (see Figure 2). A "rate-of-use" dial enables adjustment of usage rates to current levels. The energy resource reserve level in each form is represented visually on the front display panel by a verticle string of five red lights. These lights indicate increased supply by illumination; as supply is decreased, the lights turn off.

The new technology source lights are turned off until research and development functions are initiated in the matrix. This is due to the fact that at present, the energy capability supplied by solar, wind, geothermal, fusion, and other new technologies represent only one percent of the total energy resources.

When reserves for coal, oil, natural gas, and nuclear

TABLE 3

ENERGY RESOURCES DATA

FOR ENERGY ENVIRONMENT SIMULATOR

Resource	Current Energy Contribution	Chemical/Electrical Distribution	Known Reserve Calibration	Pollution Contribution
Coal	18%	65% Electrical 35% Chemical	450 Years	Air, Nuclear Unused Heat
Oil	45%	7% Electrical 93% Chemical	120 Years	Air Unused Heat
Natural Gas	32%	18% Electrical 82% Chemical	40 Years	Unused Heat
Hydroelectric	4%	100% Electrical	Unlimited	None
Nuclear	1%	100% Electrical	600 Years	Nuclear, Unused Heat
New Technology	--	100% Electrical	--	None

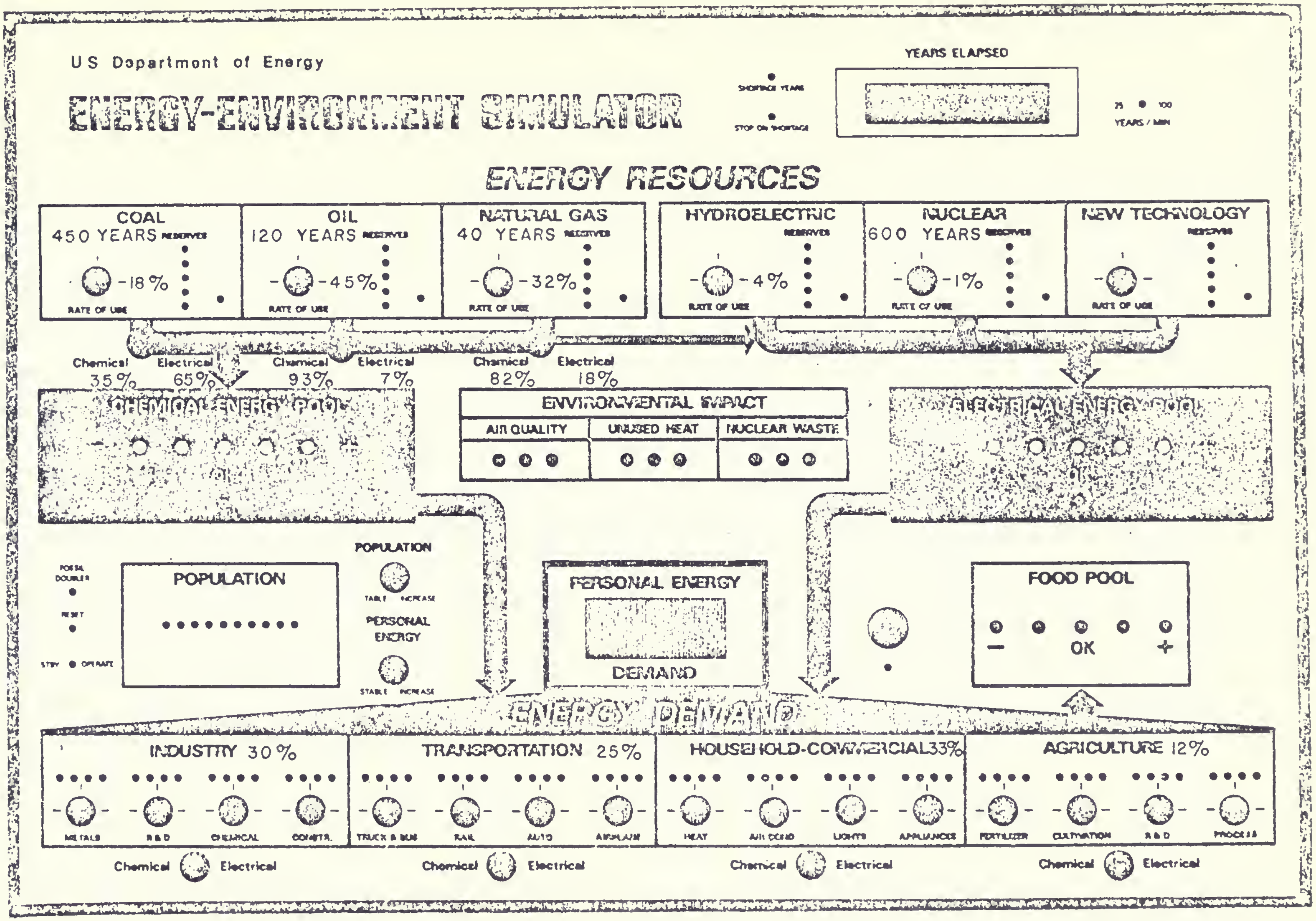

Figure 2.--Energy Environment Simulator Front Panel - Current percentage of Energy Resources Contribution, Known Reserves, and Chemical/Electrical Distribution. Also included is percentage of energy demand for each demand sector.

energy are depleted, the lights on the panel segment turn off, triggering a red warning light which indicates an "empty" state.

3. Environmental Impact

Three areas are addressed under this panel section: air quality, unused heat, and nuclear waste. Each area starts out with a green light which represents a relatively clean, healthy, and safe environment. As the various resources are developed, environmental impacts occur. Illumination of an amber light in any of the three areas indicates an environmental "problem"; a red light indicates an environmental "crisis". The ideal situation and goal is to keep all of the environmental impact areas in the green light condition.

4. Chemical and Electrical Energy Pools

The energy pools "accept" energy from the respective resource areas. In the chemical energy pool, there is a combination of energy supplied by the fossil fuels (coal, oil, and natural gas). The electrical energy pool receives its energy from hydroelectric, nuclear, and new technology and also receives electrical energy that is produced by the fossil fuels. The demand sector of the simulator also is tied into the energy pools. With the energy game, a certain demand exists on the chemical pool and on the electrical pool. These demands must be met by supplies of energy resources to the respective energy pool to maintain the desired balance. The coal, oil, and natural gas resources can be manipulated to flow at

various percentages and rates into either the chemical or electrical pools. Furthermore, the energy demands can be manipulated to demand any combination of chemical and electrical energy for the various demand sectors.

The five-lamp string in each pool consists of red (-) = serious crisis, amber = shortage, green (OK) = balance, amber = surplus, red (+) = excessive surplus. The lamp string visually demonstrates when there is too much, too little, or just the right amount of energy resource in relation to energy demands. When the amber or red light is on in the plus area, there is more energy being produced than is demanded; therefore, energy is being wasted. When the amber or red light is on in the minus area, insufficient energy is being produced to meet demands, and a shortage is indicated. The desired situation is a balance or equilibrium between energy resources and energy demands. This balance is represented by the green light in the center of the five-lamp string.

An alarm will sound when there is a serious energy shortage, and it will shut off only by balancing the supplies and demands. Balance can be achieved through increasing or decreasing energy resources and energy demands, or by shifting the supplies and demands between the chemical and the electrical energy pools.

5. Energy Demand

The energy demand sector is comprised of four major areas: industry, transportation, household-commercial, and agriculture. Each one of these major areas is broken down into four sub-areas. The industry area is responsible for 30 percent of the total U.S.

energy demand and is broken down into four areas: metals, research and development, chemical, and construction. The transportation area is responsible for 25 percent of total U.S. energy demand and is made up of four areas: truck and bus, rail, auto, and airplane. Household-commercial demand constitutes 33 percent of total U.S. energy demand and includes four areas: heat, air conditioning, lights, and appliances. Agriculture demands 12 percent of U.S. energy in these areas: fertilizer, cultivation, research and development, and process.

Energy demands are calibrated on present demand levels and can be increased or decreased during time elapse. Agriculture is related directly to the food pool and must be increased to keep up with the growing population and growing demand for food. Conservation can play an important role because the demands can be turned down in any given area.

6. Personal Energy Demand

The personal energy demand area is represented by a digital voltmeter in terms of full-time personal servants. For the U.S., the number 80 is based on per capita calorie energy useage of the population. This number reflects the material standard of living of the people of the country, i.e., on the average a U.S. citizen uses enough energy every day to feed 80 people. Table 4 shows that the U.S. consumes more energy per capita than any country in the world. This list gives the country and the respective number of energy slaves per person for the selected countries. In other words, the average U.S. citizen (or citizen of another country with respective personal

TABLE 4

PERSONAL ENERGY DEMAND

FOR VARIOUS COUNTRIES

United States	80	France	26	Taiwan	6
Canada	67	Switzerland	23	S. Korea	5
Sweden	42	Japan	18	Turkey	3
Australia	40	Israel	15	India	2
United Kingdom	38	Spain	10	Ethiopia	0.2
United Soviet Socialist Republics	32	Mexico	8		

energy number) consumes an amount of energy that would feed 80 people if energy was food. The personal energy demand number will fluctuate as time elapses and as energy demands are decreased or increased. The personal energy demand number or quality of life will rise if energy demands are increased, and it will fall if demands are decreased.

7. Population

The population component is displayed by a string of ten red lights. At the present time, the simulator displays two lights which represent 220 million people. As the time clock advances, population grows and additional lights illuminate (110 million people per light). If population continues to increase at the current rate of growth, the limit will be reached when the population is tripled. By simply turning the population dial, the participants can cut in half or stabilize the population growth rate at any time.

8. Food Pool

The food pool component is displayed by a five-lamp string similar to the energy pools. The green light (OK) in the middle represents a balance between agricultural production and the population's demand for food. An amber light and red light on the minus side represent shortages while the amber and red lights on the plus side represent surplus and waste. The ideal situation is to keep a balance (with green light on) which means there is enough food being produced to feed the population. Energy expended in agricultural research and development will, over a period of time, produce an increase in

agricultural capabilities and allow increased food production.

IV. RESPONSES, REACTIONS, AND FEEDBACK

The simulator is an effective tool for clearly demonstrating the energy-environment situation of the U.S. The real value of the simulator, however, involves people in physical and mental contact with the simulation model. After the functional areas of the simulator have been explained and the machine is switched on, the decision makers must actively participate to keep the system in balance. Crisis situations cannot be solved and equilibrium can neither be reached nor maintained without active audience participation.

A. Group Response

Responses and reactions by the target populations were varied:

1. The college population was the most willing to accept the fact that energy problems do exist in the United States. College groups also seemed to be the most active personally, for example, changing their lifestyles in order to help solve existing energy problems. College students were the most informed group and exhibited a good overall understanding of the energy situation. This group was the most skeptical and critical of the energy environment simulator program. They were not willing to accept many of the assumptions of the simulator (such as the present environmental impact area being green and representing a good, clean, healthy environment for 1978). They were more willing to speak out and debate certain assumptions of the simulator which other groups accepted without question. They normally reacted critically to the

amount of energy resource reserves available and to the degree of energy development that affected the environmental impact area. College groups critized the effect of population growth and often suggested that the limits would be reached much sooner than the simulator was programmed for.

An additional criticism which only occurred during college group presentations regarded the built-in assumption that the structure of the U.S. energy economy would remain constant. Comments were made about the highly technological energy-abundant system shifting over to small-scale technology and energy interdependence. Changes in life style from an energy intensive system and the idea that "small is beautiful" were discussed. The development of alternate, appropriate small-scale technology for private individuals and communities was viewed favorably. Growth, development, and large-scale centralized energy systems were attacked. Alternate life styles and the zero population growth concept, limited development and small, decentralized energy systems were some of the solutions that they felt are not given adequate consideration in the simulator programming. Some very interesting and worthwhile discussions took place regarding human values and personal life styles. The open discussions with the college groups were rewarding and provided much constructive feedback. Surprisingly, the college groups were not able to balance the simulator or maintain an equilibrium in the system as well as the other groups. In comparison, the college groups got the poorest records in the simulator "game".

2. High school groups were extemely excited about the program, due perhaps to its interruption of routine in the classroom. In comparison to college groups, high school students accepted nearly all simulator assumptions and were very concerned with winning. They paid close attention to the explanation of the simulator and prepared themselves to keep the system in balance. At the beginning of the presentation, some of the high school students thought that no energy problem existed, but almost all agreed in the end that an energy problem did exist. The students appeared to lack reliable information and exhibited apathy toward the energy situation. High school students generally did understand the energy crisis situation and decided early in the program that they could manage to solve the problems. The students tended to get very excited once the simulator was switched on and were in control with the use of the lap panels. A great deal of interaction occurred among the groups, and occasionally the communication process was flooded. High school students learned and reacted quickly and solved problems or crisis situations with ease and speed. Once the simulator was clearly understood, the average high school group could manipulate a variety of energy environment situations. The high school groups scored the best for controlling the energy environment simulator by solving the problems and maintaining an equilibrium in the system, although many of the students acted without thinking and made sudden drastic

changes in the system. Students would turn a dial off immediately in order to conserve energy or suddenly turn an energy resource all the way up to produce more energy; therefore, it was important to stop the simulator and talk about these conditions and ask how realistic these decisions would be in the real world. Frequently, the students thought of the simulator only as a game and forgot about the implications of real world conditions; consequently, students were reminded constantly to relate the simulator to their own lives and to actual conditions.

3. Adult groups were highly interested and very responsive to the energy environment simulator. Adults normally recognized the energy crisis and related it to economics. Adults were always willing to accept the simulator assumptions and to participate in trying to balance the system. Adults usually hesitated before making decisions even in response to crisis situations. The adult groups usually kept in mind the relationship of the simulator to actual conditions in the real world. This group was particularly interested in a clear understanding of the U.S. energy situation. The adult groups often contained policy makers, businessmen, and professional people in energy-related fields. These people asked technical and detailed questions and became involved in serious discussions about the energy dilemma. Many of the adults saw value in the simulator presentations and attempted to schedule programs for other groups.

On the other hand, many adults were only interested

in being entertained. Several times the simulator was scheduled as the special program of a regular adult meeting. During some of these meetings, the group usually was entertained and expected the simulator presentation to merely entertain. The simulator can be very entertaining, but the real value of the simulator must not be lost in the process. The simulator presentation must be viewed as an educational program with the objectives of sharing information and spreading awareness. The average adult group did very well in balancing the simulator; sometimes it took a little more time and practice, but once they got a basic understanding of the simulator, the adults manipulated a variety of conditions and maintained a reasonable level of equilibrium in the system.

B. Energy Awareness Questionnaire

A simple questionnaire was administered during 27 presentations of the Energy Environment Field Program. Three general questions were asked concerning the U.S. energy situation. A fourth question was asked in selected cases. The questionnaire was directed at determining the general knowledge, awareness, and concern of the public. All questions were asked at the beginning of the simulator program before any energy information was given to the participants. There were 760 high school students in 22 presentations, 52 college students in 3 presentations, and 50 adults in 2 presentations who responded to the questionnaire. The individual questions, asked orally to the groups, are listed in Table 5. Tables 6 through 15 contained in Appendix 1 list the responses of the participants by high school students, college students, and adult

groups. The responses are listed by order of most frequent response, common response, and least common response.

C. Feedback

At the end of the program, many of the people were asked to comment on their impressions of the simulator program. The general response was one of unanimous approval. People stated that they had gained a clearer understanding of the overall energy situation. They remarked about the clear presentation of the energy problems and the value of the exercise in the decision-making process and attempts to find solutions. Most of all, they enjoyed the program, found it very worthwhile, and many said they would do further research into the subject. They said the program was good for arousing their interest and making them more aware of the relationships between energy development and environmental quality. The energy problem is such a difficult and complicated topic that a visual aid such as the energy environment simulator is a valuable and necessary tool in public energy education.

V. CONCLUSIONS

The Energy Environment Simulator Field program has proven to be a successful approach to specialized public education. During the 67 presentations to approximately 3,100 people, there were three key aspects of continual importance:

(1) Increased Awareness of the energy environment interrelationships, problems, growth trends, and possible solutions;

(2) Information Sharing and the Exchange of Ideas between people from different backgrounds and various occupations about

the energy environment situation; and

(3) Public Participation in the decision-making process, individual and group involvement with problem solving, policy formulation, and changing attitudes and life styles in relation to energy environmental conditions.

The Energy Environment Simulator is an effective tool for displaying the limits of our present system and our strong dependency upon the dwindling fossil fuels. The ability of the simulator to depict the important interrelationships that exist in the world of energy and the environment is an added value. The complexities and the quantity of variables. of the energy environment situation make this a very difficult topic for discussion. The Energy Environment Simulator is an invaluable visual aid in helping the audience understand these important relationships.

Given the time frame of 1 to 2 hours to present the program on the U.S. energy environment situation, the best visual aids available are needed. The program would be nearly impossible to explain in one to two hours without the use of the simulator. The simulator helps the participants to mentally organize the various components of the energy world. Furthermore, the simulator then allows the participants to actively take part in crisis/problem solving and constructive decision making. "The energy game," as it has been called, requires a general knowledge of the variables of the simulator and an understanding of the interrelationships described by the Energy Environment Simulator.

The actual value of the Energy Environment Field Program is difficult to measure and can really only be speculated. The value and worth of the program can only be measured by the level of awareness, the amount of information, and the degree of actual constructive action that is

generated. Energy/environment education is necessary in order for proper conservation measures to be implemented. In addition, much support is needed by the public in order to carry out vitally needed research and development of new technologies.

I-1

ORAL QUESTIONS ASKED OF PARTICIPATING GROUPS

1. What is the most serious energy problem in the United States today? (In your opinion)
2. What is being done to solve the U.S. energy problems? (In your opinion)
3. What are you doing or what have you done, personally, to help out in relation to our energy problems?
4. What is the most serious energy problem in the State of Montana? (In your opinion)

HIGH SCHOOL STUDENTS REPLIES TO QUESTION #1

Most Frequent Responses

- Gas and oil shortages
- Shortages of all kinds of energy
- Wasting of fossil fuels
- People wasting all kinds of energy

Common Responses

- There will be a lack of energy for future demands
- Depletion of natural resources
- The strong dependency upon fossil fuels and their limited supplies
- Over population
- Electricity shortages
- Apathy toward the energy situation
- Energy intensive technology
- Energy intensive life styles
- There is no problem
- Too many cars

Least Common Responses

- Carelessness and wastefulness
- No solutions to our growing energy porblems
- Oil imports
- The mismanagement of resources
- There are no new sources of energy being developed
- Dependency on foreign energy imports
- Oil shortages and OPEC nations control of the oil

I-3

COLLEGE STUDENTS REPLIES TO QUESTION #1

Most Frequent Responses

- Energy intensive technology
- Over population
- Energy waste
- Fossil fuel shortages
- Energy intensive society and life styles

Common Responses

- Lack of proper information and constructive education for the people
- Lack of an energy plan and energy decisions that will work by the President and Congress

Least Common Responses

- The strong dependency upon imported oil
- The continual growth of energy demand

ADULT GROUP REPLIES TO QUESTION #1

Most Frequent Responses

- The American life style
- The depletion of the fossil fuels
- Energy waste
- Lack of appropriate education for the public
- People unwilling to change their energy over consumptious life styles
- Oil and gas shortages

Common Responses

- Electricity shortages
- The materialistic society
- Water shortages
- The lack of needed new technologies
- Over use and abuse of natural resources

Least Common Responses

- Food shortages in the future
- Over population and growing energy demand
- Chemical energy depletion

I-5

HIGH SCHOOL STUDENTS REPLIES TO QUESTION #2

Most Frequent Responses

- People are searching for alternative sources of energy
- Everyone is becoming more aware of the problems
- Conservation measures are taking place:

    car pooling
    driving less and driving slower
    turning down thermostats
    using smaller cars
    insulation of buildings

- Increased research and development of all energy sources

Common Responses

- Scientists and professionals are experimenting with new ideas
- Alaskan pipeline will bring more oil
- The actions of the President and Congress for an energy program
- Higher prices of all energy sources
- Increased exploration for fossil fuels
- Nothing
- Don't know of anything that is being done
- Development of atomic energy
- The use of wood burning for heat
- Increased use of coal
- Too much apathy, nothing being done

Least Common Responses

- Solar Research
- MHD Research
- The people are becoming more aware and trying harder to help out
- Strip mining of coal
- Energy education taking place
- A great deal of talk and publicity
- Population growth is being studied and questioned
- Rationing of energy is being considered

I-6

COLLEGE STUDENTS REPLIES TO QUESTION #2

Most Frequent Responses

- Voluntary conservation measures:

  car pools, driving less, smaller cars
  home insulation
  turning down the heat

- Less energy waste, more energy conscious people
- More people becoming aware and involved
- Research and development of alternative energy supplies

Common Responses

- The development of a national energy plan
- People are being educated about the energy situation
- Many people are learing more about what they can do personally
- The development of new energy sources such as solar, geothermal, wind, biomass and tidal power

Lease Common Responses

- Increased coal development
- People are questioning, speaking out, and writing against present policies of business and government
- Interchange of ideas, information, and resources with other countries of the world

I-7

ADULT GROUP REPLIES TO QUESTION #2

Most Frequent Responses

- Research and development of alternative energy sources
- Conservation measures are taking place:

  recycling
  car pools
  driving less and smaller cars
  home insulation

- Public education on conservation and energy efficiency
- More people are becoming aware through education
- A great deal of publicity and personal interest in the energy environment situation

Common Responses

- Very little is actually being done
- A great deal of concern and interest has been generated throughout the country
- There are but a few people doing anything constructive
- Nothing is being done, the public is too apathetic
- More power sources are being developed
- Solar research
- Research and development of nuclear power
- Research of coal, geothermal, wind, and other new technologies

Least Common Responses

- Increased energy legislation and tax incentives for conservation measures and the use of alternate energy
- Many books and articles being written
- Attempts being made to reach zero population growth
- Importing oil for increased demands
- Research into alternative heating

I-8

HIGH SCHOOL STUDENTS REPLIES TO QUESTION #3

Most Frequent Responses

- Turning lights off when not in use
- Walk more instead of ride or drive
- Turn down the heat
- Drive slower
- Becoming more educated and aware of the problems

Common Responses

- Recycling aluminum cans and paper
- Ride a bike, use car less
- Adjusting life style to cut down on energy use
- Conserving energy however possible
- There is no problem, it is all a put-on
- Study the problems and write a paper
- Turn off anything not in use
- Use the bus
- Start fire in fireplace at home
- Wear warmer clothes and turn down the heat

Least Common Responses

- Watch less TV
- Help put in home insulation
- Don't overuse hot water
- Help put in storm windows
- Studying better fuel uses and conservation
- Tune up autos to run better
- Cut down on cruising the drag
- Help install fireplace to burn wood for heat
- Help weather proofing the house

COLLEGE STUDENTS REPLIES TO QUESTION #3

Most Frequent Responses

- Conserving energy whenever possible
- Driving less and slower
- Turn down thermostat
- Adjusting life style to use less energy
- Walk and bicycle more often
- Car pooling
- Recycling materials
- Cutting down on all energy uses and encouraging others to conserve

Common Responses

- Limiting hot water use
- Install storm windows
- Becoming more educated and aware and trying to keep up on what is going on
- Looking into modern building for energy efficiency

Least Common Responses

- Studying up on solar heat and alternate energies
- Using wood heat
- Not much at all
- There is very little that one can do
- Supporting environmental groups like the Sierra Club and Friends of the Earth

ADULT GROUPS REPLIES TO QUESTION #3

Most Frequent Responses

- Energy conservation in the home and in personal life styles
- Turning down thermostats
- Driving smaller cars
- Driving less
- Recycling
- Becoming more educated and aware of the problems

Common Responses

- Install insulation
- Install storm windows
- Studying conservation methods and alternate energy applications

Least Common Responses

- Burn wood for heat
- Use less hot water
- Use less electric appliances
- Not much at all, there is very little that one can do